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OTTAWA HULL K1A 0C9

(11) (C) 1,336,520

(21) 444,166

(22) 1983/12/22

(45) 1995/08/01

(52) 361-27

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(51) Intl.Cl.[5] B03D 1/02

(19)(CA) **CANADIAN PATENT** (12)

(54) Alkylether Frothing Agent for Ore Flotation

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(57) 13 Claims

NO DRAWING

A B S T R A C T

ALKYLETHER FROTHING AGENT FOR ORE FLOTATION

A process for concentrating ores by froth flotation in the presence of a collector and a frothing agent wherein the frothing agent has the general formula $H\{OC_3H_6\}_nOCH(CH_3)-CH_2-CH(CH_3)_2$, in which n is an integer of from 1.0 to 3.0.

CARH04/DL

This invention relates to a process for the concentration of ores by flotation in the presence of a collector and a frothing agent.

The use of alkyl mono-ethers of di- and polypropylene glycol has been suggested before, USP 2,611,485 refers to methyl-, ethyl-, propyl- and butyl ethers of di-, tri- and tetra-propylene glycol, in particular the methyl-ether shows on average a good performance and has been sold on the market for many years under the trade name Dowfroth®250. However, presently mined ores have a much lower content of valuable metals than in the past, this sets ever increasing demands on the efficiency of the ore-dressing process and therefore likewise on the performance of the frothing agent.

We have now found that the mono-alkyl ether derived from 2-hydroxy-4-methylpentane and mono- or di-propylene glycol has a very good frothing performance, particularly for the concentration of copper ores, molybdenite ores and potash ores.

Accordingly, this invention comprises a process for concentrating ores by froth flotation in the presence of a collector and a frothing agent wherein the frothing agent has the general formula $H\{OC_3H_6\}_nOCH(CH_3)-CH_2-CH(CH_3)_2$ in which n is a value of from 1.0 to 3.0 The present alkyl mono-ethers can be prepared by any suitable method disclosed in the prior art; e.g. the process referred to in USP 2,611,485. The frothing agent can be used in an impure form, i.e. comprising a certain amount of unreacted 2-hydroxy-4-methylpentane. Preferably the latter amount is at least 50%w, based on the weight of the impure frothing agent.

Likewise, suitable collectors are those which have been proposed before, many of such agents now being available as commercial products. Concentrations of collector and frothing agent to be employed in the process of this invention are also not different from those applied in prior art methods.

EXAMPLE 1

20 g propylene oxide were reacted with 80 g 2-hydroxy,-4-methylpentane in the presence of a catalytic amount (1 g) of sodium hydroxide under a nitrogen atmosphere until a mixture with a constant boiling point (138.5 °C) was obtained. This took 5.6 hours heating under reflux. After cooling and filtration to remove a small amount of solid, 92.9 g of an amber coloured liquid were obtained. This liquid was composed of 70 % 2-hydroxy,4-methyl-pentane and 30 % of a compound with the formula $H\{OC_3H_6\}_nOCH(CH_3)-CH_2-CH(CH_3)_2$, n being 1.5.

Chalcopyrite ore having an assay of 0.34 %wt Cu was crushed to pass 8 mesh. The crushed material was ground in a rod mill during 35 minutes, at 60 %wt solids in water until 88 % passed 100 mesh. The ground material was diluted with water to 33 % solids and by the addition of CaO the pH was adjusted to 10. Flotation experiments were run in a WEMCO® laboratory flotation machine using a 3 l cell and an impeller speed of 1200 rpm. To the material in the cell a frothing agent and potassium amyl xanthate collector were added, the mixture was conditioned and frothed, and a concentrate collected. This cycle was repeated several times. The total amount of frother added was 0.042 ml and of collector 13.5 ml of 0.1% solution, and the total time for the several cycles 10 minutes. The performance of the product of this invention (frother A), i.e. the amber liquid obtained as described hereinabove, was compared with that of Dowfroth®250 (frother B), a mixture of 20% vol. Dowfroth®250 and 80% vol. 2-hydroxy,4-methylpentane (this mixture is referred to as frother C) and a mixture of 50% vol. 2-hydroxy,4-methylpentane and 50%

vol. of 2,4-dihydroxy,4-methylpentane (this mixture is referred to as frother D), and 2-hydroxy,4-methylpentane(frother E).

The results of the flotation runs are included in Table I.

TABLE I

Frother	Concentrate assay (Cu, %w)	Copper Recovery (%w)
A	1.04	84.8
B*	1.60	79.1
C*	1.21	82.2
D*	1.64	81.2
E*	2.15	77.4

* for comparison

From the above data it is seen that the frother of the invention has a better recovery performance than any of the comparative frothing agents. It is of particular interest to note that the high recovery rate shown is achieved when dressing an ore with a very low Cu-assay, i.e. 0.34 %w Cu only.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A process for concentrating ores by froth flotation in the presence of a collector and a frothing agent wherein the frothing agent has the general formula:

$$H\{OC_3H_6\}_nOCH(CH_3)-CH_2-CH(CH_3)_2,$$

in which n is a value of from 1.0 to 3.0.

2. A process as claimed in claim 1, in which the ore is a copper ore.

3. A process as claimed in claim 1 or 2, wherein said frothing agent is derived from 2-hydroxy-4-methyl pentane and mono- or di-propylene glycol.

4. A process as claimed in claim 1 or 2, wherein said frothing agent is derived from 2-hydroxy-4-methyl pentane and propylene oxide.

5. A process as claimed in claim 3, wherein said glycol is mono-propylene glycol.

6. A process as claimed in claim 3, wherein said glycol is di-propylene glycol.

7. A process as claimed in claim 3, wherein said frothing agent is in an impure form and comprises unreacted 2-hydroxy-4-methyl pentane.

8. A process as claimed in claim 4, wherein said frothing agent is in an impure form and comprises unreacted 2-hydroxy-4-methyl-pentane.

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9. A process as claimed in claim 7 or 8, wherein said impure form comprises at least 50%w, of said unreacted 2-hydroxy-4-methylpentane based on the weight of impure form.

10. A process as claimed in claim 1, 2, 5, 6, 7 or 8, in which n is 1.5.

11. A process as claimed in claim 3, in which n is 1.5.

12. A process as claimed in claim 4, in which n is 1.5.

13. A process as claimed in claim 9, in which n is 1.5.

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